VTI Instruments Announces Migration from Legacy VT1432 to the New EMX Series

In 1991, Hewlett-Packard introduced its E1432 series of VXI-based dynamic signal analysis (DSA) instruments, integrating digital signal processing, transducer signal conditioning, alias protection, digitization and high-speed computation into a modular form factor capable of addressing high channel count applications. The E1432 series grew to become the most-widely used DSA product family for noise, vibration and harshness applications, helping engineers to optimize their designs for use in a wide range of environmental conditions.

In 2003, VTI Instruments purchased Agilent Technologies' mechanical test business unit that included the E1432 series. VTI has continued to manufacture these products under the model VT1432 series, upgrading the product line in 2006 to add TEDS support, direct inputs and increased sampling rates.

In 2010, VTI began development on the 4th generation of DSA products to address customer demand for higher sample rates, distributed, synchronized measurements and the need for higher speed data throughput to disk. This resulted in the introduction of the SentinelEX family of modular DSA products (EMX Series), based on the switched serial PXI Express architecture, to deliver a powerful combination of analog measurement integrity, precise phase coherence in distributed environments, and high data throughput. Coupled with the support of gold-standard software solutions including SDRL X-Modal III and Test for I-DEAS, the EMX series is poised to build upon a proud legacy of trusted NVH solutions that had been established decades ago.

With the EMX Series of DSA products and software solutions in full production, VTI is announcing that the VT1432 series is entering its EOL phase as of 8/18/2014. We are offering our customer base the opportunity to complete last-time buys through 4/30/2015. Due to parts availability, we cannot guarantee that we can fulfill all orders. We will allocate available units on a first-come, first-served basis, after which point the VT1432 series modules will be completely replaced by the EMX series, VTIs 4th generation DSA family.

VTI Instruments

AMETEK® ADVANCED MEASUREMENT TECHNOLOGY

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Instrument Modules											
VXI Series							EMX Series				
Agilent/HP	VTI	Channels	Max Sa/sec	ADC	Input		VTI Model	Channels	Max Sa/ Sec	ADC	Input
E1432A	VT1432A	16 Chan	51.2 K	16 Bit	BOB	>	EMX4250	16 Chan	204.8 K	24 Bit	BOB
	VT1432B	16 Chan	102.4 K	24 Bit	BOB	>	EMX4250	16 Chan	204.8 K	24 Bit	BOB
E1433A	VT1433B	8 Chan	196 K	16 Bit	BOB	>	EMX4350	4 Chan	625 K	24 Bit	BNC
E1433B	VT1433B	8 Chan	196 K	16 Bit	BOB	>	EMX4350	4 Chan	625 K	24 Bit	BNC
E1434A	VT1434A	4 Chan	51.2 K	16/20 Bit	BNC	>	EMX1434	4 Chan	204.8 K	24 Bit	BNC
	VT1435	8 Chann	102.4 K	24 Bit	SMB	>	EMX4251	8 Chan	204.8 K	24 Bit	BOB
	VT1436	16 Chan	102.4 K	24 Bit	SMB	>	EMX4250	16 Chan	204.8 K	24 Bit	BOB
E3242A	VT3242A	4 Chan	Charge BOB	NA	BNC	>	EMX4380	4 Chan	625 kSa/s	24 Bit	BNC

Controllers							
VT1432 Series					EMX Series		
Agilent/HP	VTI	Interface	Max Sa/sec		VTI	Interface	Max Sa/sec
E8491B		IEEE-1394	5 MB/s	>	PXIe-PCIe8361	Cabled PCIe	200 MB/s
	EX2500A	1 Gb LAN	10 MB/s	>	EMX-2500	1 Gb/s LAN	80 MB/s

Mainframes					
Agilent/HP	VTI	Slots		VTI	Slots
E8404A		4	>	PMX04	4
E8401	CT400	13	>	CMX18	18
	CT100C	6	>	CMX09	9

Software				
Model Name	Rev.		Type	Min. Rev.
DAC Express	N/A	>	EXLab	5.0
Test for I-DEAS	6.1	>	Test for I-DEAS	6.4
SDRL X-Modal	II	>	SDRL X-Modal III	III
plug&play API	N/A	>	IVI API	N/A

SIZE AND WEIGHT

The EMX series takes advantage of the evolution in technology that has occurred in recent years, with increased computational horsepower residing in a decreased footprint, and less power and cooling required for the electronics. This has resulted in a considerable size and weight reduction when compared to the VT1432 equivalent. The following tables illustrate this in a few examples.

Large System (VT1432 Series = 176 channels + source)				
Qty	Model	Size (H x W x D)	Unit Weight	Ext Weight
1	CT-400	14" x 16.7" x 25"	50 lbs	50 lbs
1	EX2500A		2.5 lbs	2.5 lbs
1	VT1434		3.3 lbs	3.3 lbs
11	VT1432B		3.4 lbs	37.4 lbs
		Total		93.2 lbs
Large System (EMX Series = 256 channels + source)				
Qty	Model	Size (H x W x D)	Unit Weight	Ext Weight
1	CMX18	7" x 18.1" x 18.14"	26.2 lbs	26.2 LBS
1	EMX-2500		0.55 lbs	0.55 lbs
1	EMX-1434		0.65 lbs	0.65 lbs
16	EMX-4250		0.58 lbs	9.28 lbs
		Total		36.68 lbs

Medium System (VT1432 Series = 64 channels + source/tach)				
Qty	Model	Size (H x W x D)	Unit Weight	Ext Weight
1	CT-100C	6.96" x 15" x 21.3"	22 lbs	22 lbs
1	EX2500A		2.5 lbs	2.5 lbs
1	VT1434		3.3 lbs	3.3 lbs
4	VT1432B		3.4 lbs	13.6 lbs
		Total		41.4 lbs
Medium System (EMX Series = 112 channels + source)				
Qty	Model	Size (H x W x D)	Unit Weight	Ext Weight
1	CMX09	7" x 10.53" x 10.8"	10.8 lbs	10.8 lbs
1	EMX-2500		0.55 lbs	0.55 lbs
1	EMX-1434		0.65 lbs	0.65 lbs
7	EMX-4250		0.58 lbs	4.06 lbs
		Total		16.06 lbs

Small System (EMX Series = 12 channels + source)				
Qty	Model	Size (H x W x D)	Unit Weight	Ext Weight
1	PMX04	7" x 10.53" x 10.8"	10.8 lbs	10.8 lbs
1	EMX-1434		0.65 lbs	0.65 lbs
3	EMX-4350		0.58 lbs	4.06 lbs
		Total		16.06 lbs

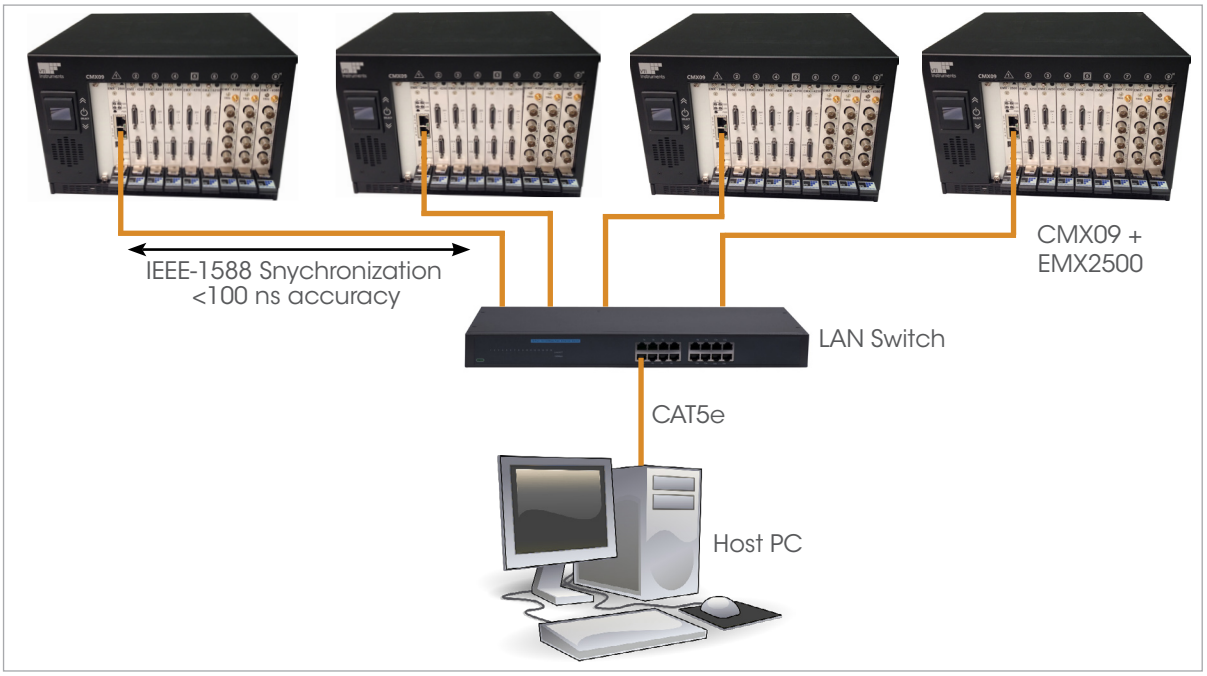
DISTRIBUTED MEASUREMENTS, PRECISE PHASE COHERENCE

The industry trend in mechanical test is moving away from a model in which there is a centrally located rack of instrumentation to one that distributes the measurement hardware as close to the test article as possible. The EMX series incorporates an LXI-PXIe interface that turns the PXI Express chassis into an Ethernet instrument that can reside >100 meters from the host. There are numerous benefits that can be realized by reducing the analog cabling.

- Lower cost – The backbone is comprised of readily available CAT5e cables and Ethernet switches
- Improved performance – Analog signals are carried over a shorter distance
- Improved maintainability – A single CAT5e cable can connect the host to >200 input signals

A new challenge is introduced when distributing measurement channels across multiple mainframes as it relates to ensuring that all measurements are tightly synchronized. With the VT1432, synchronization is achieved by creating a physical connection between the chassis backplanes. This was typically achieved by integrating backplane extender modules (typically MXI2) and 'daisy-chaining' the modules together using proprietary cables, with a limitation between chassis and host of about 20 meters.

VTI's EMX-2500 interface integrates the IEEE-1588 precision time protocol to precisely synchronize EMX Series NVH modules that are distributed over LAN. When using an EMX-2500 as the interface to the mainframe, measurement data can be synchronized across mainframes to within 100 nanoseconds. Figure 6 provides a high-level overview of a distributed measurement system using EMX series modules.



SUPERIOR DATA THROUGHPUT

When the VT1432 series was first introduced to the market, it became the gold standard for large scale NVH applications due in part to its ability to throughput large data sets from the measurement hardware to a PC for display, storage and analysis. Typical max throughput with any slot 0 interface is 5Mbytes/sec, but when using the VT2216 throughput disk, 16.4 MB/s could be moved to the controller.

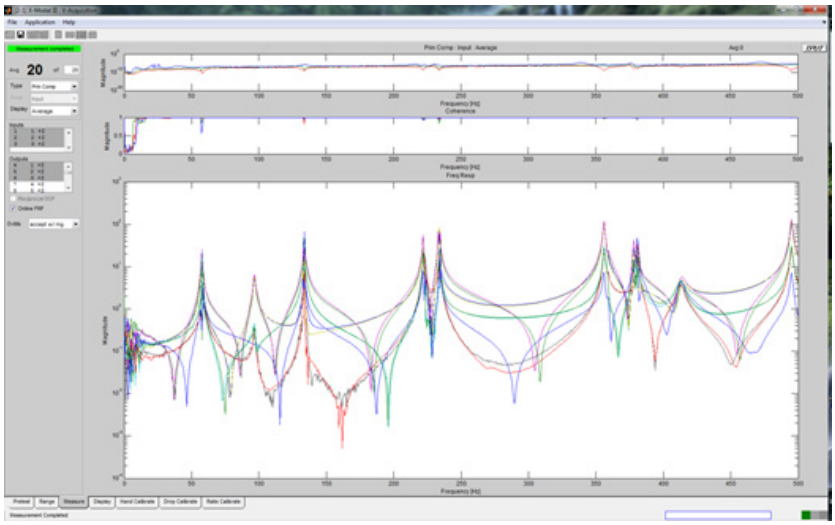
By leveraging the switched serial architecture that is at the core of the PXI Express backplane in combination with the EMX-2500 LAN interface, the EMX series is capable of moving 90 MB/s between the instrumentation and the host. For applications in which the channel count and sample rate combination exceeds 90 MB/s, a cabled PCIe interface can be swapped in place of the EMX-2500, without requiring change in application code, to achieve up to 200 MB/s to disk. This provides engineers the ability to construct large channel count, high sample rate systems without the risk of overflowing on-board memory. Table 7 presents a throughput comparison between the VT1432 and EMX series for an application requiring 100,000 samples/second.

Configuration	Max Throughput	Sample Rate	Bytes/Sample	Max Channels
VT1432	4.9 MB/s	102,400 Sa/s	4 (24-bit)	11
VT1432+VT2216	16.4 MB/s	102,400 Sa/s	4 (24-bit)	40
EMX-4250 + EMX-2500	90 MB/s	102,400 Sa/s	4 (24-bit)	219*
EMX-4250 + Cabled PCIe	200 MB/s	102,400 Sa/s	4 (24-bit)	488**

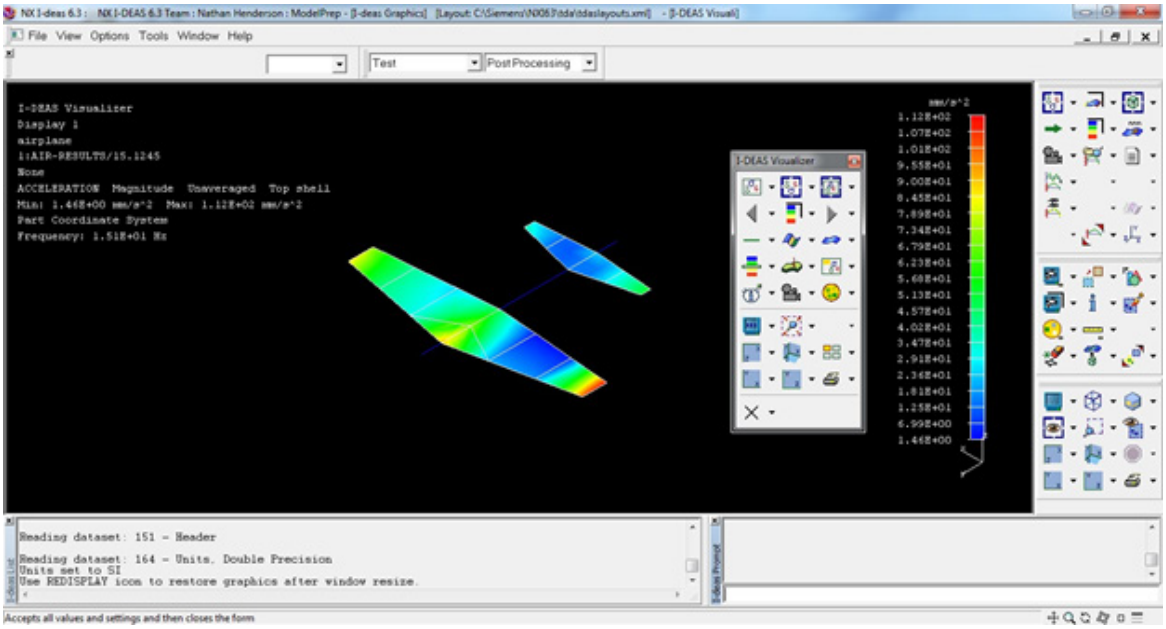
*With LAN as the intfrastructure you can sum the output from multiple mainframes by using an Ethernet switch with more bandwidth (10 Gig or 40 Gig) for truly unlimited throughput capability.
**Exceeds the number of channels (256) that can be accommodated in a single mainframe.

SOFTWARE

The VT1432 family is supported by robust turnkey DSA software solutions that continue to be widely used today, including Maya HTT's Test for I-DEAS and SDRL's X-Modal. Both software packages have been upgraded to support the EMX series to provide a seamless transition for end users who depend on these software applications to collect and analyze data. VTI has also introduced EXLab as a turnkey solution used for general purpose data acquisition applications, replacing DAC Express.



X-Modal III


File View Options Tools Window Help
Test
Post Processing
I-DEAS Visualizer
Display 1
airplane
1:AIR-RESULTS/15.1245
None
ACCELERATION Magnitude Unaveraged Top shell
Min: 1.46E+00 mm/s^2 Max: 1.12E+02 mm/s^2
Part Coordinate System
Frequency: 1.51E+01 Hz
Reading dataset: 151 - Header
Reading dataset: 164 - Units, Double Precision
Units set to SI
Use REDISPLAY icom to restore graphics after window resize.
Accepts all values and settings and then closes the form

Test for I-DEAS

For engineers who desire the freedom to develop their own application software using the VT1432 series, VTI provides a full VXI plug&play API. This flexibility has made the VXI product family the most widely used DSA product world-wide. The EMX series builds on this legacy by offering full Windows and Linux APIs. Two APIs are available for software developers, a Digitizer API that is optimized for high-speed data acquisition applications, and a DSA API that simplifies code development for NVH applications.

NEW FEATURES, INCREASED CAPABILITY - THE EMX SERIES

Engineers familiar with the VT1432 family of products will benefit from a number of feature enhancements when migrating to the EMX series. New capabilities introduced with the EMX series include:

Enhanced signal Conditioning

- EMX4350 IEPE current programmable for either 4 or 10mA for long cable runs for accelerometer range improvement
- EMX4380 IEPE current programmable for either 4 or 10mA and Charge input
- EMX4250 IEPE current is programmable from 2 to 20mA

Increased sample rates

- EMX4250 204.8KSa/sec per channel
- EMX4350/4380 625KSa/sec per channel

Improved Maintainability

- IEPE Open/Short circuit indication on all modules or BOB's
- Enhanced built-in self test and auto calibration

Precise Data Time Stamping

- IEEE 1588 Precision Time Protocol (<100 ns accuracy)

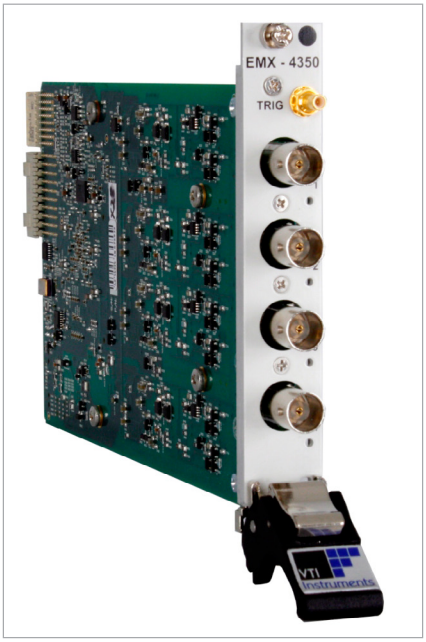
Superior analog performance (add spec detail)

- -125 dB Spurious Free Dynamic AC/DC Inputs
- Analog Anti-alias filtering >60dB attentuation
- High bandwidth capability (270 kHz @ -0.2 dB)
- 24 Bit analog-to-digital converter (ADC) provides best-in-class noise immunity

DIGITIZER MODULES

EMX-4350

625 KSA/S, 4-CH, 24-BIT SMART PXIE DSA INSTRUMENT, IEPE AND VOLTAGE



- 625 kSa/s/channel, 24-Bit ADC, 4-Channel
- True Differential, IEPE or Voltage, AD/DC Inputs
- Flexible analog and user defined digital filter combinations
- Best-in-class noise immunity
- Highest quality instrumentation grade ADC's outperform commonly used audio grade ADC's
- Best-in-class -125 dB SFDR
- Unparalleled fully programmable excitation (2 mA to 20 mA)
- Deterministic channel-to-channel, card-to-card, and chassis-to-chassis phase response

EMX-4380

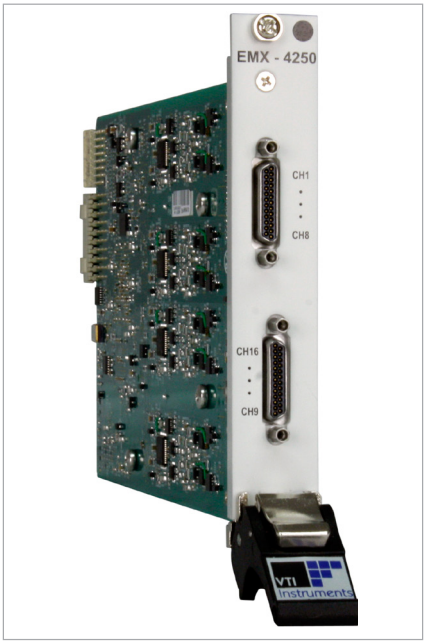
625 KSA/S, 4-CH, 24-BIT SMART PXIE DSA INSTRUMENT, IEPE AND VOLTAGE

- First integrated data acquisition instrument to support IEPE, charge, and voltage inputs
- 625 kSa/s/channel, 24-Bit ADC, 4-Channel
- Flexible analog and user defined digital filter combinations
- True differential inputs with 25 V Isolation
- Exceptional noise immunity
- Highest quality instrumentation grade ADC's outperform commonly used audio grade ADC's
- Fully programmable excitation (2 mA to 20 mA)
- Deterministic channel-to-channel, card-to-card, and chassis-to-chassis phase response

DIGITIZER MODULES

EMX-4250

16-CHANNEL, 204.8 KSA/S SMART PXIE DSA DIGITZER



- 204.8 kSa/s/channel, 24-Bit ADC's, 16-Channel
- Differential inputs deliver superior common mode performance
- Flexible analog and user defined digital filter combinations
- -105 dB SFDR
- Seven auto-ranging input ranges from 100 mV to 10 V
- Deterministic channel-to-channel, card-to-card, and chassis-to-chassis phase response

INPUT BREAKOUT BOXES

EMX-4008/4016

625 KSA/S, 4-CH, 24-BIT SMART PXIE DSA INSTRUMENT, IEPE AND VOLTAGE

- Designed to work with EMX-4251/EMX-4250
- 8 channel (EMX-4008) and 16 (EMX-4016) channel variants available
- LED Channel Health Indicator
- BNC Connections for signals
- External Trigger Connector
- External Calibration Input Connector
- Rack mountable

AWG/SOURCE MODULE

EMX-1434

204.8 KSA/S SMART PXIE ARB. WAVEFORM SOURCE, WITH 2-CH TACH AND 4-CH DIO

- 4-Channel, 204.8 kSa/s/channel, 24-Bit DACs
- -115 dB spurious free dynamic range
- Integrated 2-Channel 64-bit tachometer
- Integrated 4-Channel DIO
- Tight synchronization with DSA analyzers
- Ideal for rotational measurement, and stimulus-response applications such as vibration test
- Output modes including Sine, Burst Sine, Chirp, Burst-random and continuous random

MAINFRAMES

CMX09

9-SLOT 3U PXIE HIGH PERFORMANCE RUGGED CHASSIS, UP TO 8 GB/S BANDWIDTH

- 9-slot PXI Express chassis with 1 system controller slot, 6 peripheral slots, 1 hybrid slot and 1 timing slot
- High bandwidth PCIe Gen 2 backplane with 2 GB/s slot bandwidth and 8 GB/s system bandwidth
- Combine with EMX-2500 LXI controller for Ethernet connectivity and distributability in the EMX09
- True 4U chassis
- Rugged construction with extended temperature range
- Smart switch display for health monitoring and control
- First PXI Multicomputing (PXImc) ready chassis
- Rack mount, custom front panels, and bolt-down option available

MAINFRAMES

CMX18

18-SLOT 3U PXI EXPRESS CHASSIS, UP TO 8 GB/S BANDWIDTH

- 18-slot PXI Express chassis with 1 system controller slot, 6 peripheral slots, 10 hybrid slots, and 1 timing slot
- High bandwidth PCIe Gen 2 backplane with 2 GB/s bandwidth per slot (4 GB/s on high-bandwidth slots) and 8 GB/s system bandwidth
- Rugged construction with extended temperature range
- True 4U chassis
- IEEE-1588 distributed instrument synchronization
- Built-in system-monitoring provides confidence in system operation and simplifies debugging

CONTROLLERS

EMX-2500

GIGABIT ETHERNET LXI CONTROLLER FOR EMX SERIES PXIE INSTRUMENTS

- Industry's first gigabit Ethernet LXI Remote controller for PXI Express

  Up to 90 MB/s sustained throughput
- Allows remote access to VTI's SentinelEX PXIe instruments from anywhere in the world on any internet enabled device
- Multi-chassis synchronization using precision IEEE-1588-2008 standard time source
- Easy to set up for distributed data acquisition systems
- Simplified instrument discovery and usage – just type in the IP address to connect to the instrument
- IVI drivers supporting wide variety of Application Development Environments and Operating Systems
- REST HTTP protocol for cloud support and advanced web applications

CONTROLLERS

PXIE-PCIE8381

PCI EXPRESS (X8 GEN 2) CONTROL OF PXI EXPRESS, 3.2 GB/S PRACTICAL THROUGHPUT

- x8 Gen2 PCI Express control of PXI Express
- Practical sustained throughput up to 3.2GB/s
- Support multiple chassis with common PCIe controller
- Software transparent link that requires no programming
- Create multichassis systems using the PXIe-8384
- Support peer to peer data transfer between chassis
- Cabling up to 3m

EMX-2401

INTEL CORE I5 2.4 GHZ, 8 GB RAM, 160 GB HARD DRIVE, PXIE EMBEDDED CONTROLLER

- Powerful computing power with Intel® Core™ i5-520E 2.4 GHz processor
- Dual Channel DDR3 SODIMM, Up to 8 GB 1066 MHz
- Up to 2 GB/s system throughput
- PXI Express Link Capability Four Links Configuration x4 or Two Links x8
- Integrated SATA hard drive, 160 GB 7200 RPM
- Integrated I/O enabling Hybrid test-systems: Dual Gigabit Ethernet ports, Four USB 2.0 ports, Micro-D GPIB connector, DVI-I video connector, ExpressCard/34 expansion slot, Trigger I/O for advanced PXI™ trigger functions
- Programmable watchdog timer